

REMARKS

This application has been carefully reviewed in light of the Office Action dated May 15, 2007. Claims 1 to 24 are currently in the application, with Claims 12 to 24 having been withdrawn from consideration. Claims 1 and 6 are the independent claims currently under consideration. Reconsideration and further examination are respectfully requested.

Amendments to Claims 1 and 6 indicated above are not believed to add new matter to the application. Support for these amendments are found at least in paragraph [0033] of the specification.

Claims 1, 4 to 6, and 8 to 11 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,032,904 to Hosick et al. (herein "Hosick"). Applicants have reviewed Hosick and respectfully submit that the claimed invention is patentably distinguishable over Hosick for at least the following reasons.

Independent Claim 1, as amended, concerns a system for providing attitude control with respect to a spacecraft. In particular, the system includes control logic configured to adjust a plurality of reaction wheel assemblies associated with the spacecraft in order to control the attitude of the spacecraft. The system further includes control logic configured to use a plurality of gimbaled thrusters associated with the spacecraft to control the momentum associated with adjusting the plurality of reaction wheel assemblies. The adjustment of the plurality of reaction wheel assemblies is modified based on a torque deficit associated with the plurality of gimbaled thrusters.

Similarly, independent Claim 6, as amended, concerns a system for providing attitude control with respect to a spacecraft. The system includes a reaction wheel control module configured to adjust a plurality of reaction wheel assemblies associated with the spacecraft in

order to control the attitude of the spacecraft. Further, the system includes a maneuver control module configured to use a plurality of gimbaled thrusters to control the total momentum of the spacecraft. The total momentum includes the momentum associated with the plurality of reaction wheel assemblies during an orbit transfer. The adjustment to the plurality of reaction wheel assemblies is modified based on a torque deficit associated with the plurality of gimbaled thrusters.

The foregoing arrangements of attitude control systems include a component for adjusting a plurality of reaction wheel assemblies in order to control the attitude of the spacecraft. The adjustment to the plurality of reaction wheel assemblies is modified based on a torque deficit associated with a plurality of gimbaled thrusters. This feature is not understood to be disclosed or suggested by Hosick.

Hosick is understood to concern a system utilizing a pair of electric thrusters which co-operate for orbit raising and for selectively unloading momentum wheels used for controlling the orientation of the spacecraft. (Column 1, lines 7-12). As described, the system includes a control mechanism to spin up and slow down the momentum wheels in such a manner as to control the attitude of the spacecraft as desired. (Column 7, lines 1-5). When wheel speeds reach threshold values, an unload module gimbals electric thrust devices away from the normal orbit raising position to produce a desired torque. (Column 10, lines 14-17). The unload logic module holds the thrusters at the unload position until the wheels are sufficiently desaturated at which point the electric thrusters are returned to the nominal no-torque orbit raising position. (Column 10, lines 17-21).

Hosick is not understood to describe modifying adjustments to the momentum wheels based on a torque deficit associated with the electric thrusters. Accordingly, Hosick is not

understood to disclose or suggest at least the feature of modifying an adjustment to a plurality of reaction wheel assemblies based on a torque deficit associated with a plurality of gimbaled thrusters. Therefore, independent Claims 1 and 6 are believed to be allowable over Hosick. Reconsideration and withdrawal of the § 102(b) rejection of Claims 1 and 6 are respectfully requested.

Claims 1, 4 to 6, and 8 to 11 also were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent No. 6,622,969 to Yamashita (herein "Yamashita") in view of U.S. Patent No. 6,481,672 to Goodzeit et al. (herein "Goodzeit"). Claims 2, 3, and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamashita as modified by Goodzeit and further in view of U.S. Patent No. 6,870,164 to Baldwin et al. (herein "Baldwin"). Applicants have reviewed the applied references and respectfully submit that the claimed invention is patentably distinguishable over the references for at least the following reasons.

As previously recited, independent Claims 1 and 6 are directed to attitude control systems that include a component for adjusting a plurality of reaction wheel assemblies in order to control the attitude of the spacecraft. The adjustment to the plurality of reaction wheel assemblies is modified based on a torque deficit associated with a plurality of gimbaled thrusters. This feature is not understood to be disclosed or suggested by Yamashita and Goodzeit.

Yamashita is understood to describe a maneuvering device for a satellite that can change an attitude angle and an angular velocity of the satellite by means of an attitude control actuator such as a thruster and a reaction wheel. (Column 1, lines 6-11). As described, the maneuver device performs attitude maneuvers for the satellite using two types of control torque: the control torque generated by the thruster and the control torque generated by the reaction wheel. (Column 13, lines 41-47). Maneuver is carried out while the attitude error of the satellite

dynamics caused by the thruster during maneuver is compensated by the control torque generated by the reaction wheel. (Column 10, lines 63-66). However, Yamashita is not understood to describe or even suggest at least the feature of the adjustment to the plurality of reaction wheel assemblies based on a torque deficit associated with a plurality of gimbale thrusters.

Goodzeit, which was applied for its disclosure of a system having control logic to control gimbale thrusters is not seen to remedy the foregoing deficiencies of Yamashita. In particular, Goodzeit is not seen to disclose or suggest the feature of modifying an adjustment to a plurality of reaction wheel assemblies based on a torque deficit associated with a plurality of gimbale thrusters.

Baldwin, which was applied in the rejection of certain dependent claims, is not understood to remedy the deficiencies of the references discussed above. Specifically, Baldwin is not understood to disclose or suggest at least the feature of modifying an adjustment to a plurality of reaction wheel assemblies based on a torque deficit associated with a plurality of gimbale thrusters.

Therefore, independent Claims 1 and 6 are believed to be allowable over the applied references. Reconsideration and withdrawal of the § 103(a) rejection of Claims 1 and 6 are respectfully requested.

The other claims under consideration in the application are dependent from the independent claims discussed above and therefore are believed to be allowable over the applied references for at least the same reasons. Because each dependent claim is deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendment and remarks, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience.

Applicants' undersigned attorney may be reached in our Irvine, California office at the number shown below. All correspondence should continue to be directed to the address associated with the customer number indicated below.

Respectfully submitted,

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